Vol. 4. No. 3

March, 1948

# SPE NEWS

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SPE NEWS

Issued Monthly to all Members of the Society of Plastics Engineers

Vol. 4 No. 3 March, 1948

# PLASTICS IN AIRCRAFT — A RECORD AND A CHALLENGE

By LA VERNE E. CHEYNEY
Battelle Memorial Institute, Columbus, Ohio

L. E. Cheyney

Plastics have been employed throughout aircraft, often for structural uses. They have also been employed in power plants, in propellers, and in miscellaneous parts of the plane. For example, in the tail section of the plane, stabilizers, stabilizer tips, tabs, and tail cones have been made of plastics. Propeller blades, chafing rings, barrel supports, spider spacers, and interior fillers for hollow steel propellers have been constructed from various plastic and resinous materials. In the wing section of the plane, wing tips, rocket tubes, fuel tanks, leading edges, radar housing, and other applications have been employed. In the fuselage of the plane, there are, of course, the well-known and highly publicized transparencies, including windows, domes, turrets, etc. The actual fuselage section has been made from various plastics, as have such things as escape hatches and doors. Many people do not consider plastics in connection with the power plant of the plane, but, actually, such things as gaskets, seals, shipping plugs, distributor and magneto parts, terminals, wire and cable coating, hoses, gears, air ducts, and other plastics applications are found in the power-plant section of the plane.

The use of plastics may be illustrated by the use of transparent acrylic resins instead of glass for the transparencies of the plane. Here we have, not only less weight; we have also more ready formability, greater resistance to impact, higher optical clarity, and other advantageous properties. In the case of laminated plastics, which may be employed for structural applications, the low specific gravity is an important factor. In some cases, superior insulating properties, better resistance to compression buckling, better resistance to deteriorating influences, and a variety of other miscellaneous properties seem to contribute toward the use of plastics in aircraft.

The usual competition is with metal, although there are a few specific cases where ceramic materials may also be considered. Wood has also been somewhat extensively employed in aircraft construction, especially in England; actually, wood is a borderline material, which for many reasons must be classed with plastics. Most of the airplane companies are, essentially, metal fabricators and the use of any new materials involves not only setting up new production cycles but training large numbers of people and learning the properties of new and strange materials. In general, there is an understandable reluctance to apply such materials in such applications.

All of the plastics materials which have been employed in aircraft, in one application or another, possess some faults. For example, although the transparent acrylic resins have better impact resistance than glass, and although they possess better aging, better dimensional stability and better strength than some of the cellulose-derivative plastics first employed as substitutes for glass, they still possess a number of definite faults for aircraft application. These include such things as difficult formability (many rejects), poor abrasion-and-impact-resistance, objectionable transparency to infrared, difficulty of de-icing, crazing, and creep, or cold flow. Some of the thermosetting materials, such as the allyl esters, possess certain advantages in one or another of these properties, but usually possess other disadvantages which more than offset any gain which might result from their use.

*(Continued on Page 17)*

# SPE NEWS

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## A REPORT TO THE NATIONAL COUNCIL

The SPE NEWS has grown right along with the rest of the Society. In October, 1945, it was a four page pamphlet. The January, 1948, issue was thirty-two pages plus cover and program. We are hoping it can continue to grow and be of real service to everyone in the Society.

Some suggestions and plans for the future are as follows:

We think the Prize Paper Contest is a good thing for the S. P. E. and for the plastics industry. It should be continued. It is suggested that posters be made and sent to all sections so that they can be posted in technical schools and universities and on plant bulletin boards in every area. Each section should set up its Contest Committee to publicize the contest. Perhaps the section closing date should be October first and the National closing date November first to give the judges adequate time to judge papers.

Now, a look at the costs of the S. P. E. News. Last year every magazine printed cost an average of 27.8c per copy. The October issue cost only 14c but the December issue cost 42c. Into cost has been figured printing, making cuts, editorial expenses, postage on the magazine, and cost of envelopes. Advertising paid us about 18.3c per copy over the whole year. (October 3c and December 64c). In other words, each copy cost the Society's treasury about 9.5c.

From the last three issues of the magazine we have seen that advertising can be gotten if there is someone to get it. We can make some contacts by letter but it is the personal contacts that sell the ads. We suggest that in addition to the sectional sponsorship of the NEWS an advertising representative be appointed by each local section to keep contact in his section. (Perhaps arrangements can be made whereby the section treasuries benefit some also.) To show what can be done, Toledo grossed $532.50, Newark $1,377.50 and Detroit (with the help of G. C. Best) $1,615.00. Ten full pages of advertising is roughly about $1,000.00 and a 28-page issue costs about that. December cost about $920.00. We think the NEWS can be put on a break-even basis with a little more advertising.

**COUNCILMEN IN DETROIT**

**Front to back—left to right: P. Roche, R. Chollar, T. Clark, W. Dunnigan, A. Utzinger, H. Lynch, T. Orr, R. L. Davis, L. H. Amrine, A. E. Russell, M. S. Moulton, P. H. Marvin, R. G. Dailey, R. Bishop, J. DuBois, L. Barnett and M. Petretti.**

In 1947, of the 172 pages of material printed in the S. P. E. News, news from each local section accounted for 39 pages of that material. Just as the S. P. E. News grew in size so the section news grew in volume. It is the intention of the S. P. E. News to print even more local section items in 1948. The picture of the section reporter sending in the news items is going to be used with each item he sends in, just as soon as the pictures can be obtained. The S. P. E. News also would like to use more personal items. It will appreciate every member's participation in sending in personal items about himself and other members of S. P. E. Following is a tabulation by section of each section's participation in the S. P. E. News:

| SECTION | Number of Times Reported | Inches of Space Used |
|---|---|---|
| Saint Louis | 9 | 36½ |
| Central Ohio | 8 | 53½ |
| Newark | 8 | 99 |
| Northwestern Pennsylvania | 8 | 46 |
| Miami Valley | 7 | 33¼ |
| Philadelphia | 7 | 38¼ |
| Toledo | 7 | 57½ |
| Cleveland | 6 | 66¼ |
| Detroit | 6 | 58 |
| New York | 6 | 32½ |
| Eastern New England | 5 | 15 |
| Rhode Island and S. E. Mass. | 5 | 52¾ |
| Buffalo | 4 | 21¾ |
| Chicago | 3 | 26 |
| Rochester | 3 | 22½ |
| Western New England | 3 | 18 |
| Indianapolis | 2 | 15½ |
| Mid Continent | 1 | 3½ |
| Milwaukee | 1 | 2¼ |
| Northern Indiana | 1 | 3½ |
| Southern California | 1 | 3½ |
| Rocky Mountain | 1 | 2 |

**Cleveland, Toledo and Newark sections sponsored an issue of the news therefore would have more inches of space used.*

## CENTRAL OHIO OFFICIALS

**By RONALD D. BECK**

Dr. L. E. Cheyney, 1948 President of the Central Ohio Section of S.P.E., is a chemist by training, with degrees from the University of Akron, University of Pennsylvania, and Ohio State University. His industrial experience includes several years of employment with the B. F. Goodrich Co. and the Goodyear Tire & Rubber Co. He has taught courses in rubber and plastics at the University of Akron and the Goodyear Industrial University. He is at present employed at Battelle Memorial Institute, where he is in charge of research on rubber and rubberlike materials. He is active in the American Chemical Society and served as co-chairman of the Polymer Symposium sponsored by its Columbus Section in 1947. He is a member of A.S.T.M. Committee D-11 and is chairman of its sub-committee on adhesion. He is a member of the Southern Ohio Rubber Group and its program committee. He is the author of about twenty published articles and a large number of patents. He served as

M. W. Burkhart

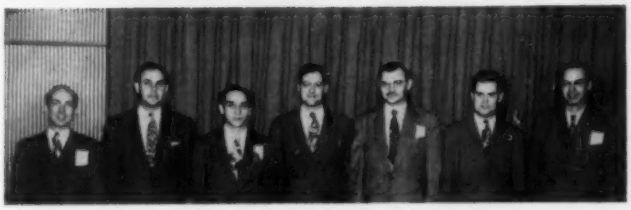
C. W. Cooper

secretary of the Central Ohio Section and secretary of the National Advisory Council of S.P.E. in 1947. He was also a member of the Speakers Committee for the 1948 National Annual Technical Conference, as well as being a speaker on the program.

M. W. Burkhart, 1948 Vice-President, is a consultant on plastics engineering, with the Plastics Design and Sales Co. His technical training was received at the General Motors Technical Institute and Youngstown College. His previous experience was with the Packard Electric Division of General Motors, Plastics Division of Reynolds Spring Co., and Plastics Division of Continental Can Co. Mr. Burkhart has previously served as treasurer of the Central Ohio Section and has been chairman of several important committees.

C. W. Cooper, 1948 Secretary, is a research engineer at Battelle Memorial Institute. He is a chemistry graduate of the University of Buffalo and has previous industrial experience with DuPont and with Pierce and Stevens. He was publicity chairman of the section during 1947.

## BOARD OF DIRECTORS, NEW YORK SECTION



**Left to Right: W. C. Peterson, Stanley Bindman, V. P., John Bancale, Arthur Nufer, Pres., Sam Silberkraus, Secy., George Rice, Treas., George Brinkema. Not on Photograph: L. J. Francisco, Vincent Saggese.**

R. D. Beck, 1948 Treasurer, is a plastics development engineer at the Plastics Division, Continental Can Co. His undergraduate training in chemistry was received at Otterbein College, and he has taken graduate training at Ohio State University. His previous industrial experience was with the Parker Appliance Co. He is a co-author of "Applied Plastic Product Design." Mr. Beck has previously served as secretary and as vice-president of the Central Ohio Section.

R. L. Davis, National Director, is former treasurer of the section. He is a graduate of Lehigh University and is now sales manager of the Fabri-Form Co. He is a co-author of "Applied Plastic Product Design" and has previous experience with Plastic Manufacturers, Inc., General Electric Co., and Plastics Division, Continental Can Co. He has also served as instructor in plastics at Purdue University and is in considerable demand as a speaker on product design.

C. D. Jones, Director, is chief product technologist for Owens-Corning Fiberglas Corporation. He is a graduate of Ohio State University. He is active in S.P.I. and has held several important committee posts in the Central Ohio Section of S.P.E.

H. C. Simons, Director, is sales manager for the Ohio Plastic Co. He is a graduate of Ohio Northern University and has been employed at the Chrysler Corp., International Harvester Co., Airtemp, Inc., and the Ohio Rubber Co.

*(Continued on Page 8)*

R. D. Beck

R. L. Davis

# REPORT OF THE CHAIRMAN NATIONAL PUBLICITY COMMITTEE

**William Schack, Field Editor—"Plastics"**

The possibilities for publicity of a technical organization such as SPE are necessarily limited. While a professional, high pressure publicity man might "cook up" additional means, I am not so sure that it would be desirable. This is not to say that we have had as much press notice as we should, but we have limited ourselves to the more obvious possibilities.

First, let me report on what actually was done in the past year. The first newsworthy event on a national scale was the prize contest. Releases were sent out to the wire services—AP, UP and INS, to newspapers in the larger cities, to such trade papers as are interested in plastics developments, and to the house organs of plastics companies. In additional, secretaries of all the chapters were advised to inform their local newspapers about the contest and to have notices posted on the bulletin boards of all companies in their areas which have a stake in the plastics industry.

While it was not practicable to make a check-up on all these media, a survey of plastics publications and house organs showed that we got satisfactory coverage.

The second, and even more newsworthy event, is the current convention. Advance notice of the convention was sent to the wire services and newspapers in major cities, and as a follow-up, abstracts of the convention papers were sent to the Detroit press and the national wire services in the automotive, electrical, and other fields which are end-users of plastics materials. However, arrangements are being considered to publish all the convention paper in consolidated form, similar to the S.A.E. transactions. While these are intended primarily for members, we are also planning to explore the possiblity of selling them to the members of other engineering societies.

Finally, it may be relevant to mention an unofficial piece of publicity for the industry here. This is a general educational article on plastics written for the New York Times Sunday Magazine by your publicity chairman and another SPE member in good standing—J. H. DuBois. This article has not yet been published.

So much for the past year. While there does not seem to be much scope for more national publicity for SPE this year unless it undertakes new activities, there are other possibilities on a local scale.

(1) Secretaries of all SPE chapters should contact the editors of the newspapers in their towns and find out just how much space they can give to SPE. It may be only an advance notice of a meeting or a sentence or two report of the meeting. Any mention is worthwhile insofar as it brings the word "Plastics" to the attention of the public. There should be no hesitation in calling on the editors, who are always available for legitimate business—and if you don't stay too long.

(2) The SPE sections can also obtain much more publicity in the trade press than they have. Plastics publications will be glad to consider a compact paragraph or two reporting the talk given at a meeting. But this report should not be confined to papers in the plastics field. If a speaker discusses some plastics problem affecting, say the automotive industry, the report of the meeting should be sent to trade papers in that field. Usually the speaker will know the publications which would be interested in his subject. To be of any news value to an editor, these reports must be sent out immediately after a meeting.

A third source of publicity is to be had from the personal appearance of an SPE member at any public occasion, especially of an industrial nature. If the event is reported in the press—general or trade—and he is mentioned, he should get that SPE after his name like a Ph.D. The same holds true for members who get their work in print in media outside the industry.

One general criticism must be made of our procedure—lack of advance preparations. It should be our policy to have authors send us complete copies of their papers at least three weeks ahead of the convention, together with glossy prints of their illustrations. Without them, the publicity unit is badly handicapped. This procedure would eleminate the expense of making records of the talks at the meetings and of transcribing them. It would also help the various persons involved to co-ordinate their activities. Finally, it would simplify the task of publishing the material ourselves, whether as a volume of transactions or in the SPE News.

While the search for publicity has led, as you know, to the growth of a highly competitive big-time profession, not always in the public interest, a certain amount of legitimate publicity is to be had for the asking. That is the kind of publicity which is available to SPE. But we've got to know when and where to ask.

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# HISTORY of CENTRAL OHIO

By RONALD D. BECK and
LA VERNE E. CHEYNEY

The Central Ohio Section, Society of Plastics Engnieers, Inc., was officially organized at a meeting held on July 8, 1945, at Granville, Ohio, with L. S. Shaw, National Secretary-Treasurer, officiating. Charles A. Ebner, Yardley Plastics Co., was elected president for the remainder of that year.

The first regular meeting was held on Oct. 8, 1945, at Granville Inn, with William Stout, one of the foremost designers of the day, as guest speaker. Along with Mr. Stout's informative and entertaining speech, the group was educated in the field of Fiberglas products with a display of samples and talks by Owens-Corning engineers.

In order for the group to become better acquainted with the different types of plastics industries in the Central Ohio Section, members and guests of the section have been the guests of many of the local industries.

The Ohio Plastics Company, Frazeysburg, Ohio, under the guidance of George Edwards, company president, has entertained the section on two occasions, with excellent dinners, a tour through the Ohio Plastics plant, souvenirs, a basketball game, and a dance.

The Fabri-Form Company, Byesville, Ohio, opened its doors to the group in September, 1946, and contributed a fine dinner, followed by a tour through their plant and a detailed explanation of fabrication of plastic sheet.

In October 1946, the members were invited guests on a tour through Battelle Memorial Institute, Columbus, Ohio. Science at its best is displayed in this fine institution and the section is very fortunate in having some of their group among its membership. After the long tour through the Institute, the members were dinner guests of the Yardley Plastics Co.

In April 1947, the Hydraulic Press Mfg. Co. invited the section to their plant at Mt. Gilead, Ohio, for dinner and a tour through their heavy equipment manufacturing plant.

Ralph Reel of the Pharis Tire & Rubber Co., Newark, Ohio, presented to the members an enlightened tour through the Pharis plant in May 1947. All those present were highly entertained and learned a great deal about the manufacture of automobile tires.

It has been possible to supply a considerable portion of the monthly meetings with some highly talented speakers from the section membership and the Central Ohio territory:

Homer Winkler of Battelle presented an excellent lecture to the group in June 1946 on the subject of "Printing Processes." His talk was directed particularly toward the application of plastics in printing, both now and in the future.

Charles D. Jones of Owens-Corning presented a lecture and movies on Fiberglas—reinforced low-pressure laminates in Nov., 1946.

M. W. Burkhart of Plastics Design and Sales Co. gave an instructive lecture on mold, tool, and die design in Dec. 1946.

In Jan. 1947, L. E. Cheyney, R. A. Clark, and T. J. McCuistion of Battelle presented a panel discussion on "Low Density Plastics."

Robert L. Davis of the Fabri-Form Co., spoke to the section on the subject "Plastic Product Design" in October 1947.

Recent talks by local talent have included those by George Edwards, Ohio Plastic Co., on the subject "Where Are We Going?" and Stephen Palinchak of Battelle on the subject "A Novel Method of Fabricating Flexible Vinyl Materials."

The section has also been fortunate in having some outstanding speakers from outside the territory. These have included W. H. Aiken, Goodyear Tire & Rubber Co. ("Plastic Films"), T. W. Noble, Fabricon Products, Inc. ("Low Pressure Laminates"), and Gordon C. Mack, patent attorney ("Patents").

Each spring the section has an outing at a country club where the members get together to play golf, spin yarns, and have an extra chance to get some liquid vitamins along with their regular food. Here again many noteworthy speeches and a display of excellent oratory are presented, but none of the facts ever reach the record books.

Officers and directors of the Central Ohio Section have included C. A. Ebner and F. B. Hill, Jr. (Yardley Plastics), J. W. Knight (Fabri-Form), G. W. Keny (Columbus Plastic Products), M. G. Sherwood (Continental Can), G. W. Edwards (Ohio Plastic), and R. M. Reel (Pharis Tire). 1948 officers are L. E. Cheyney, President (Battelle), M. W. Burkhart, Vice-President (Plastic Design and Sales), C. W. Cooper, Secretary (Battelle), and R. D. Beck, Treasurer (Continental Can). R. L. Davis (Fabri-Form) is both National Director and a local director. Other local directors are H. C. Simons (Ohio Plastic), N. Roop

*(Continued on Page 16)*

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## BUFFALO PLANS FUTURE

### COMMITTEEMEN ANNOUNCED

**By J. C. CASSIDY, Jr.**

Thirty-three members and guests attended the highly successful January meeting of the Buffalo Section. After the introduction of guests, President John Miner called upon Earl Russell, National Director for a report on the Detroit meeting, after which the following committee chairmen for 1948 were introduced: National Director, Earl Russell; Professional Activities, Elmer Howard; Membership, Alex Di Adario; Credentials, George Goepert; Finance, Hi Nathan; Program, Jim Cox; House, Hi Nathan; Publicity, Clarke Cassidy; Historical, Norm Wahl; Educational, Si Pickering; SPE News, Clarke Cassidy; SPE Advertising, Si Pickering.

Each chairman introduced his committee and gave a brief summary of activities planned for the coming year. Hi Nathan then presented a brief treasurer's report.

George Brown, scheduled for a thumbnail sketch, was unable to attend because of illness. Henry Bryzinski presented an interesting summary of his activities in resin research at Durez.

John Miner next called on Jim Cox to introduce the speaker of the evening, James V. Veverit, well-known Buffalo Industrial Designer. Mr. Veverit presented a most interesting outline of the functions and aims of the members of his profession. With the help of a large number of renderings, mock-ups, and finished products, he explained the sequence followed in designing a product for marketing. He stressed the cooperation necessary between the designer's organization and the engineering and sales departments of the client.

In discussing his experience with plastics, Mr. Veverit emphasized that plastics combined with other materials, each used for specific purposes, was the best answer to many design problems, rather than the use of a single material alone.

The "Watts in Glass" movie by Owens-Corning was shown after a short intermission and was well received by all.

* * *

The Board of Directors of the Buffalo Section has met twice since their initial meeting on December 29. On January 9, John Miner was host. Positive action was taken on the following proposals:

1. Guests who are logical prospective members of SPE to be dinner guests of the Buffalo Section at their first meeting.
2. Guests and members to be registered at all meetings.
3. Forms to be prepared and distributed to members for the listing of prospective members, this list to be turned over to the Membership Committee. (This was accomplished at the January meeting. Any of you who were not present, please jot down such names on a post card addressed to your Secretary.)
4. A new alphabetical roster of members to be prepared.

A second meeting was held at the home of George Goepfert on February 6. Positive action was taken as follows:

1. Favors to be presented to the ladies at the March meeting.
2. A Buffalo delegation to attend the organization meeting of the Buffalo-sponsored Toronto Chapter sometime in March.
3. The Forum scheduled for each meeting to be deferred until a more workable plan is arranged.
4. Si Pickering to be asked to head a committee to investigate how best to have the plastics industry represented at the coming Niagara Frontier Industrial Exhibit sponsored by the Buffalo Chamber of Commerce.
5. A product display to be presented at each meeting by a member company.

* * *

The February meeting was in Hotel Westbrook. Trimold, Inc., had on display samples of injection molded items of their manufacture and Dick Van Geem presented a brief resume of the company's activities.

George Brown of Plastic Engineering & Development Co., and Bob Brinkert of Rudolph Wurlitzer Co., were called upon for thumbnail sketches of their activities in plastics.

The feature of the evening was the Rockford Machine Tool Company movie on the "Rockford Hy-Jector" molding machine which preforms, electronically preheats, and plunger molds thermosetting material in an automatic continuous cycle. A speaker was on hand to supplement the movie.

## NEED MAN IN INDIA?

S. M. Patel, 141 W. Main St., Newark, Delaware, Chemical-Physicist Graduate (Bombay U., India). One year Advance Plastics Technology at Plastics Industrial Technical Institute, Los Angeles, M. S. in Polymer Chemistry at Delaware University, due in May 1948. Member of the Society of Plastics Engineers and Plastics Institute, London. Business experience, speak several Indian languages, foreign expreience. Wish to serve American plastics materials, chemicals or machinery manufacturing company which may have, or wish to have, a business relation with India, as a salesman or technical adviser, or any such related job in India. Also interested in investing money for agency in India. Will undergo training in corporation if necessary from June to December 1948.

# PLASTICS in CENTRAL OHIO

By RICHARD A. CLARK, ROBERT L. DAVIS,
and CLARE E. BACON

Within the territorial limits of the Central Ohio Section are found a wide diversity of plastics activities. This territory is roughly bounded by the following Ohio cities: Marion, Portsmouth, Marietta, and Dover. The perimeter of this territory is approximately 500 miles. It is believed to be a unique section, in that some of its members travel as much as 150 miles to attend meetings, and the members themselves represent a wide variety of interest in plastics.

Below is a partial list of the companies in this area engaged in direct or indirect work with plastics, with the list broken down according to the type of activity in which the companies are engaged. It should be noted that there are listed companies who produce raw materials for plastics, companies who shape plastics, as by molding, extruding, calendering and laminating, and companies who are consumers of plastic articles in one form or another. There are also represented supporting enterprises, such as equipment manufacturers, tool, die and mold makers, designers and consultants, and research institutions. Included also are industries which might be interpreted as being a part of the plastics world, or else closely allied to it, such as industries engaged in making rubber products, shoes, paper, paints, and adhesives.

The size of the organizations represented in this tabulation ranges all the way from one-man enterprises, such as consultants, to corporations which are outstanding in their fields. This area includes, for example, one of the leading manufacturers of injection molding equipment, a leading extruder, one of the most important sheet plastic fabricating concerns, an important fabric coating company, a prominent converter of plastic films, the largest independent research organization in the United States, and other companies which are leaders in their respective fields. The list of products produced is quite impressive and essentially runs the gamut of the field of plastics.

**MOLDERS—**

J. E. Baker and Associates, Newark, Ohio (injection).
Cambridge Molded Plastics, Cambridge, Ohio (compression and injection).
Campro Co., Cambridge, Ohio (injection).
Columbus Plastic Products Co., Columbus, Ohio (injection).
Continental Can Co., Cambridge, Ohio (compression and injection).
G. M. Fisher Body Ternstedt Division, Columbus, Ohio (compression).
Kilgore Manufacturing Co., Westerville, Ohio (injection).
Lincoln Plastics Corp., Cambridge, Ohio (injection).
Meridian Plastics, Inc., Byesville, Ohio (injection).
Moore Enamelling and Manufacturing Co., West Lafayette, Ohio (compression)
Ohio Plastic Co., Frazeysburg, Ohio (injection)
Yardley Plastics Co., Columbus, Ohio (injection)
North Electric Co., Marion, Ohio (injection)

**EXTRUDERS—**

E. T. Plastics Co., Columbus, Ohio
Multicol, Inc., Columbus, Ohio
Plastex Corp., Columbus, Ohio
Yardley Plastics Co., Columbus, Ohio

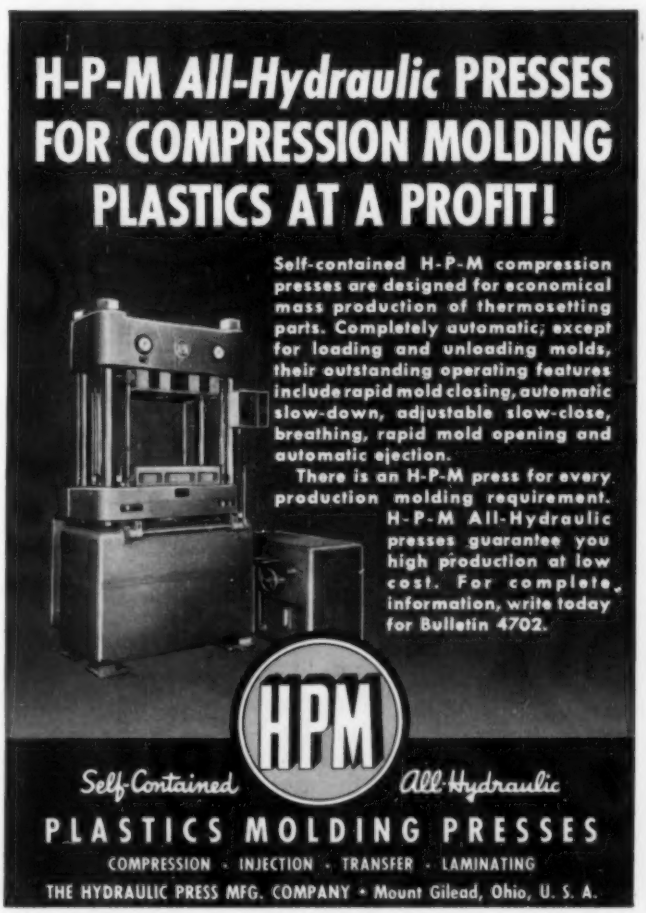
**CALENDERING AND COATING—**

Columbus Coated Fabrics Corp., Columbus, Ohio.
Columbus Glove Manufacturing Co., Columbus, Ohio.
Edmont Manufacturing Co., Coshocton, Ohio
Mead Corp., Chillicothe, Ohio.
Shellmar Products Corp., Mt. Vernon and Zanesville, Ohio.

**LAMINATORS—**

Continental Can Co., Cambridge, Ohio.
General Electric Co., Coshocton, Ohio.
Meridian Plastics, Inc., Byesville, Ohio.

*(Continued on Page 8)*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## PLASTICS IN OHIO (Continued from Page 7)

Shellmar Products Corp., Mt. Vernon, Ohio.
Western Products, Inc., Newark, Ohio.

**CONVERTERS OF PACKAGING MATERIALS—**

Shellmar Corp., Mt. Vernon and Zanesville, Ohio.
Western Products, Inc., Newark, Ohio.

**FABRICATORS—**

Allen Manufacturing Co., Columbus, Ohio.
Columbus Plastic Products Co., Columbus, Ohio.
Fabri-Form Co., Byesville, Ohio.
Kilgore Manufacturing Co., Westerville, Ohio.
Plastex Corp., Columbus, Ohio.
Yardley Plastics Co., Columbus, Ohio.

**MANUFACTURERS OF RUBBER PRODUCTS—**

Casto Co., Marietta, Ohio (molded specialties)
Columbus Glove Manufacturing Co., Columbus, Ohio (gloves and aprons).
Dragon Manufacturing Co., Marietta, Ohio (molded goods).
Edmont Manufacturing Co., Coshocton, Ohio (gloves).
Henrite Products Corp., Ironton, Ohio (molded goods).
K and W Rubber Co., Delaware, Ohio (drug sundries).
Pharis Tire and Rubber Co., Newark, Ohio (latex and molded products).
Oak Hill Sponge Rubber Co., Oak Hill, Ohio (sponge rubber products).
Cory Rubber Co., Marion, Ohio (molded specialties).

**RAW MATERIAL MANUFACTURERS OR SUPPLIERS—**

Barrett Divn. of Allied Chemical and Dye Co., Ironton, Ohio (phthalic anhydride).
B. F. Goodrich Co., Marietta, Ohio (vinyl resins).
W. G. Hardesty Co., Dover, Ohio (plasticizers).
Ironsides Co., Columbus, Ohio (phenolic resins).
Keever Starch Co., Columbus, Ohio (starch derivatives).
Owens-Corning Fiberglas Corporation, Newark, Ohio (Fiberglas).

**CONSUMERS—**

Anchor Hocking Glass Co., Lancaster, Ohio (seals and caps).
Curtiss Wright Corp., Columbus, Ohio (msc. airplane parts).
G. M. Fisher Body Ternstedt Division, Columbus, Ohio (msc. auto parts).
Lustron Corp., Columbus, Ohio (prefab house parts).
Ohlen Bishop Manufacturing Co., Columbus, Ohio (saw handles).
Plastic Woodcrafts, Columbus, Ohio (msc. bonding materials).

**SHOE COMPANIES—**

Foot-Choice Shoes, Inc., Marietta, Ohio.
Irving Drew Shoe Co., Lancaster, Ohio.
H. C. Godman Co., Columbus, Ohio.
Hardy Shoe Manufacturing Co., Columbus, Ohio.
Joyce California, Inc., Columbus, Ohio.
Julian and Kokenge Co., Columbus, Ohio.
Prima, Inc., Columbus, Ohio.
Selby Shoe Co., Portsmouth, Ohio.
G. Edwin Smith Shoe Ca., Columbus, Ohio.
T. Dickerson Walker Co., Columbus, Ohio.
Williams Manufacturing Co., Portsmout, Ohio

**MANUFACTURERS OF PAPER, PAINTS, AND ADHESIVES—**

Caram Chemical Co., Grove City, Ohio (adhesives).
Chillicothe Paper Co., Chillicothe, Ohio (paper).
Dean and Barry Paint Co., Columbus, Ohio (paint).
Franklin Glue Co., Columbus, Ohio (adhesives).
Granville Paper Co., Granville, Ohio.
Mead Corp., Chillicothe, Ohio (paper).
Shepard Paint Corp., Columbus, Ohio (paint).
Waterproof-Ohio Paper Co., Columbus, Ohio (paper).
Frey Yenkin Paint Co., Columbus, Ohio (paint).

**EQUIPMENT MANUFACTURERS—**

Alten Foundry & Machine Works, Lancaster, Ohio.
Denison Engineering Co., Columbus, Ohio.
Hydraulic Press Manufacturing Co., Mt. Gilead, Ohio.
Jeffry Manufacturing Co., Columbus, Ohio.
Meridian Plastics, Inc., Byesville, Ohio.

**TOOL, DIE AND MOLD MAKERS—**

Accurate Manufacturing Co., Columbus, Ohio.
Kline Manufacturing Co., Galena, Ohio.
Newark Plastics, Inc., Newark, Ohio.
Perma-Flex Mold Co., Columbus, Ohio.
Putnam Tool & Die, Cambridge, Ohio.
Superior Pattern Works, Cambridge, Ohio.

**DESIGNERS AND CONSULTANTS—**

Charles W. Ballman, Columbus, Ohio.
Robert S. Crane, Columbus, Ohio.
R. J. Francis, Granville, Ohio.
John R. Haines, Columbus, Ohio.
Borden W. Hively, Columbus, Ohio.
Fred and Lillian Fukal, Cambridge, Ohio.
Plastics Design and Sales, Newark, Ohio.

**RESEARCH—**

Battelle Memorial Institute, Columbus, Ohio.
Ohio State University, Columbus, Ohio.

## OHIO OFFICIALS (Continued from Page 3)

Nathan Roop, Director, is chief design engineer for Columbus Plastic Products, Inc. His technical education was received at the Columbus Art School and the International Correspondence Schools. He has previous employment with the Stiver Display Co., Whyte Studios, and the Jaeger Machine Co.

B. W. Hively, Director, is president of Multicol, Inc. He was formerly employed by Columbus Plastic Products, Inc., and has also acted as a private consultant on plastics. He is also a member of S.P.I.

## "LOGOQUANT" DISCUSSED IN DETROIT

**By PAUL B. LILLIS**

Another lively meeting of the Detroit Section was held in the Detroit Leland Hotel on February 20.

P. B. Lillis

In line with the Program Chairman's objective to present a variety, the next meeting has been well planned. On March 19, in the Rackham Memorial Building, at a Dinner Meeting the "Rose Bowl Film" will be shown with a commentary by Wally Weber, Assistant Coach at the University of Michigan.

Dr. Johan Bjorksten who developed "Logoquant" gave a very enlightening speech. Dr. Bjorksten is the Founder and Director of Bjorksten Research Laboratories. He was educated in Finland where he received his M.S.D. in Chemistry, Physiology and Mathematics. He obtained a Ph.D. in Organic Chemistry at the University of Helsingfors.

Recently, the Chicago Section of American Chemists selected Dr. Bjorksten as one of the ten most able chemists in the specialized field of Industrial and Engineering Chemistry in the United States.

Dr. Bjorksten told how the Nash Kelvinator Corporation came to him as the head of the Bjorksten Research Laboratories and asked that a coating to improve the surface of polystyrene be developed.

Only several days before the contract expired a suitable coating was developed. Bjorksten patents are assigned to the Nash Kelvinator Corporation and this company has licensed the Bee Chemical Company, Chicago, Illinois to manufacture the Logoquant materials.

Logoquant may be either dipped or sprayed. It is supplied in various viscosities. In ordinary relative humidity it is necessary to dry the coating. In temperatures ranging from 125° to 140° F. the coating can be handled in ten minutes and will be completely dry in fifteen to twenty minutes. Maximum hardness will be attained after approximately twenty-four hours.

The cost of Logoquant, an important factor, in most cases is in the range of 1¼ to 2½ cents per square foot.

Polystyrene coated and uncoated pieces were tested for various characteristics.

By the ASTM method D-673-44 using No. 80 carborundum grit and arbitrarily taking the treated panel as 100%, the untreated panel was

*(Continued on Page 10)*

## ST. LOUIS TALKS USES

**By A. W. BRUST**

The February meeting of the St. Louis Section was a smoker type meeting at eight o'clock on Tuesday, February 24 in the Melbourne Hotel.

The meeting date has been shifted to the fourth Tuesday, instead of Wednesday, in order to accommodate a number of members who have other Wednesday engagements. It is hoped that this change in date, together with a change in type of meeting will meet with approval and result in somewhat better attendance than we have had at the last few dinner meetings.

Al Werner, the Program Chairman, has gotten together a program everyone will want to see, hear and take part in.

A movie showed the operation of the Hy-Jector automatic molding machine, produced by the Rockford Machine and Tool Co.

Three of our members, Floyd Green, Frank Adam Electric Co., Donald Voorhies, Hussman-Ligonier Refrigerator Co., and Otto Wulfert, Wagner Electric Co., told what plastics were doing in their respective businesses and pointed out the advantages and disadvantages of these applications in local plants. As users of plastics, they had some further questions to ask the plastics industry concerning the more effective use of plastics in industry. All of the members entered into the discussion.

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## LOGOQUANT AT DETROIT

*(Continued from Page 9)*

82%. For comparison a good spar varnish was determined to be 92%.

The light transmission of the treated polystyrene was raised to 85% while the untreated had 73%.

The Logoquant treatment changes the electrical change on polystyrene from positive to negative, somewhat minimizing the attraction for dust. It depends on what the "charge" of the air happens to be at the time.

The coating increases the repolishability, resistance to solvents, gloss, and effect of ultraviolet.

All of the above results were shown with samples. Samples were also displayed showing colors dispersed in the coating. This looks promising in many applications.

In the question period followed by his speech, Dr. Bjorksten was asked what Logoquant consists of, and is it thermoplastic or thermosetting. In answer to what it consists of, he did not answer, but leaving everyone puzzled said it had characteristics of both thermoplastic and thermosetting materials.

The Technical Professional Activities Committee took over for a panel on "Plastic Molding Technique." The panel consisted of the following members:

Mr. J. A. Mickey, Chairman, Ford Motor Co.; Mr. R. C. Bedell, Michigan Molded Plastics; Mr. R. G. Dailey, Wolverine Plastics Co.; Mr. Gunnar Lindh, Udylite Corporation; Mr. W. R. Kosy, Lyon, Inc.; Mr. John Dietrick, Great Lakes Plastics.

They attempted to answer such questions as "Are injection machines designed properly for pressures required?" "Does lowering the temperature on thermoplastic material improve the surface appearance of the molded piece?" "Does a flash chrome mold finish cause sticking if it is too smooth?". Think about these questions. Can you answer them?

## *Klippings from Kozy*

**By WALTER KOSY**

**Emil Gazdik,** former technical service representative for Bakelite, Thermoplastic Division, Wire Coating Department, is now with Evans Winter Hebb of Detroit as Sales Representative. Best of luck to you, boy!

**Dr. C. W. Selheimer,** served as a Director for the Detroit S.P.E. Section last year, was recently honored by the Detroit Rubber and Plastics Group, Inc., when he was elected Chairman for 1948. Nice work, Doc, and congratulations from all your S.P.E. friends.

Our scholarly **Mr. Tillitson** of the Wayne University faculty has been made Administrative Secretary of the Wayne University Chemical Engineering Department. Modest Mr. Tillitson hastens to say that this appointment is "only temporary" and is prouder of his work with the University Plastics Laboratory which serves the community as a center for plastics education and industrial research.

Prize winning paper writer **Rufus Wint** of Hercules Powder Company has left Detroit for the East on one of the most important assignments in his career. After the wedding they'll honeymoon in Georgia.

## TALK ON PATENTS GIVEN AT CENTRAL OHIO

**By W. F. YOST**

The Central Ohio Section of SPE held its February meeting at Moundbuilders Country Club, Newark, Ohio, February 12.

After dinner, the business meeting was called to order by Dr. L. E. Cheney, President. National Director Bob Davis reported on the National Technical Conferences, emphasizing particularly the plans for re-organization of the Professional Activities Committee and this years' plans for the SPE News. Plans were discussed for the next issue of the News of which our Section is co-sponsor along with the New York Section.

In accordance with the established policy of the Section of using, insofar as possible, local members as speakers, the Section heard a very interesting and informative discussion by Dr. Stephen Palinchak of Battelle Memorial Institute on fabricating flexible vinyl materials.

Door prizes, donated by Columbus Plastic Products were then presented.

Mr. Gordon C. Mack, patent attorney, of Akron next addressed the group. An interesting and timely sidelight to Mr. Mack's talk was the exhibit of a patent awarded in 1849 to Abraham Lincoln.

Both talks provided excellent background for the spirited question and answer period which followed as usual.

The members of the Section who attended the National Conference report unanimously that Bob Dailey and the various committees did a swell job.

It is interesting to note that of the 37 members and guests attending this meeting, less than 10 were residents of the town where the meeting was held. Of the remainder, 3 travelled 120 miles to attend and the others travelled from 30 to 50 miles.

## SOUTH TEXAS MEETS

**By M. A. ARTHUR**

The South Texas Section held a dinner meeting on Wednesday, February 18th, on the Mezzanine of the Ben Milan Hotel in Houston. Mr. V. C. Henrich, manager of the new Rohm & Haas Co. plant in Pasadena, spoke on "Plexiglas and Its Applications." There was a sound movie, "Looking Ahead Through Plexiglas" shown.

A display table for acrylics was arranged and members brought samples which were shown and demonstrated.

# MOLECULAR WEIGHTS

By V. AUERBACH
Development Department Bakelite Corporation
New York Section

**Introduction and Objectives**

In recent years the plastics industry has laid increasing emphasis on the question of molecular structures. Unfortunately, confusion on this matter of major technical importance extends not only to the consumer but also to many of the molders and fabricators, who are prone to forget that a molecular weight quoted by one company or laboratory may be altogether different (by as much as several hundred percent) from that quoted by another company or laboratory for the same sample. It might be in order, therefore, to review the significance and meaning of molecular weights, the methods of measurement used, the types of answer given by these different procedures, and the relationship of these molecular weights to the characteristics of the molding material.

**Types of Molecular Weight Averages**

Since a high polymer is a molecularly heterogeneous product containing hundreds of thousands of distinctly different molecular species, it is customarily characterized in terms of its **average** molecular weight. This average molecular weight cannot be measured directly and is therefore computed from some behavior of the material (or more frequently, of a solution of the material) to which it is related in some known fashion. The type of molecular weight average so determined depends upon the particular property chosen for test.

Thus, the change effected in the freezing point or boiling point or vapor pressure of a pure liquid by the dissolution therein of some solute is a function **solely of the number of dissolved molecules** (1) and is independent of the size, shape, weight, structure, or chemical composition of those molecules. If one measures this change in freezing point or boiling point or vapor pressure of a liquid effected by dissolving therein a known weight of a resin, the number of molecules in solution can be computed, and this information in conjunction with the weight of the resin used suffices to give the average molecular weight. Numbers calculated from such data and/or from osmotic pressure measurements which fall in the same category are referred to as "number average molecular weights."

Unfortunately, the first three methods, which are in many respects the simplest, experimentally and in addition, absolute, i. e., provide a direct answer without the necessity of calibration against some other technique, cannot be used beyond a very limited range; since for high molecular weights (in excess of a few thousand) the difference being measured becomes so small as to avoid quantitative detection. For this reason the osmotic pressure method remains as the primary absolute means of obtaining number average molecular weights of high molecular weight resins such as polystyrene.

A second type of molecular weight average, the **"weight average molecular weight"**, is determined by measurement of some behavior which is a function of **both the number and the weight** of the molecules involved. The ultracentrifugation

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(1) The effects of association or dissociation (ionization) of the solute are disregarded in this discussion. With certain resins, however, these factors must be taken into account.

*(Continued on Page 12)*

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# MOLECULAR WEIGHTS

*(Continued from Page 11)*

technique, the most reliable albeit most costly and time consuming method employed for such determinations, affords perhaps the most readily visualized concept of how the weight of the individual molecules enter into the picture.

In the ultracentrifuge the molecules of the resin (in solution) are subjected to a very great centrifugal force, of the order of magnitude of 50-60,000 times that of gravity, and their motions under the action of this imposed force, i. e., their movement away from the axis of rotation, can be followed by means of a complex optical system. The centrifugal force exerted upon a particle, all other things being equal. varies directly with the mass of the particle. The relationship correlating the experimentally measured quantities with the molecular weights, therefore, involves an expression containing the weights of the molecules as well as the number of molecules.

It should be pointed out that the weight average molecular weight of a specimen is invariably greater than its number average molecular weight except in one instance. Where the specimen is molecularly homogeneous, i. e., consists of a single molecular species, the number and weight averages are identical.

The molecular weight methods cited thus far are founded on sound theoretical grounds, and provide, therefore, absolute values. Many other methods, including the dilute solution viscosity procedure so widely employed and the melt viscosity methods upon which considerable work is currently in progress rest largely on empirically derived relationships. As a consequence, two restrictions are imposed upon their utility. First, the measurement must be made under rigorously controlled conditions corresponding to those for which the governing equation or equations have been defined; otherwise the relationships are not valid. Second, where absolute values are required, calibration against one of the absolute methods is necessary. Also, these calibrations apply only to the given resin, and where resins of other chemical types and/or compositions are to be measured additional calibrations are needed. A fuller appreciation of the usefulness and of the limitations of such technique can perhaps best be obtained from a somewhat more detailed consideration of the widely employed dilute solution viscosity procedure for the determination of the molecular weight. Polystyrene will serve as an illustration.

**Dilute Solution Viscosity Method**

The computation of molecular weights from dilute solution viscosity data is based on the empirical relationship, developed by Staudinger, that the specific viscosity of a dilute resin solution divided by the concentration of the solution, N sp/c, varies directly and linearly with the molecular weight, M.

Thus, N sp/c equals KM.

where K is a proportionality constant for a **given polymer** in a **specified solvent** at a fixed temperature. (For example, K equal 1.8 x 10-4 for **polystyrene** in **benzene** at **20.0 deg. C.**)

It can be shown by an extremely simple computation that when the viscosities are measured in a capillary tube viscosimeter such as the Ostwald or Fenske types, the specific viscosity is equal to one less than the ratio of the flow time of the solution, t, to the flow time **in the same instrument** of an **equal volume** of pure solvent, to, thus:

$$N\ sp\ equals\ \frac{t}{to} - 1$$

All that is required experimentally, therefore, is the measurement of the flow time of a 0.100% solution of the polystyrene in a viscometer for which the flow time of an equal volume of pure solvent has been determined. The molecular weight determined in this fashion will be referred to in this discussion as the **"relative molecular weight"** to distinguish it from the absolute molecular weight. An explanation of the factors affecting the proportionality constant, K, will provide the reasons for the disparity not only between this relative and the number or weight average molecular weights, but also between the relative molecular weights emanating from various sources.

The difference in figures forthcoming from separate laboratories originate in one or more of three major ways. The first and most obvious discrepancy lies in the fact that more than one value for the constant K appear in the literature and no unanimous agreement has been reached on any one of these. A second, more subtle, variance arises from differences in experimental procedures. Supposedly minor changes in method are instituted and results obtained from the revised technique are compared with those from the original procedure. If these are in agreement the revisions, which may have been suggested for reasons of convenience or expediency, are adopted. Unfortunately, the products subsequently measured usually embrace a wider range of molecular weights than that for which the new method was evaluated and the fact that the two methods were parallel within some given range does not necessarily imply that they will remain so over a greatly enlarged range. Errors of this type appear quite often when more concentrated solutions are used as is sometimes required by changing to other types of viscometers. The third, and perhaps most fundamental difference, stems from the limitations on K itself. To the conditions of temperature and solvent imposed upon any given K value must be added a stringent restriction upon the chemical composition **and molecular structure** of the resin. Thus, where two polystyrenes of different molecular structure are considered, one might be entirely straight chain structure, whereas the other might contain branched and/or cross-linked chains, two different values of K would be in force. Similarly, a series of copolymers, each of different chemical composition, might each be governed by a separate constant. Obviously, the use of a single K value for a variety of resins, in fact, for a num-

ber of polystyrenes of diversified past histories, could lead to grossly erroneous results.

This obstacle, however, is not always as formidable as may appear at first glance. For example, **where a number of polystyrenes made by essentially the same production sequence are being examined, or where several other defining behaviors and properties of samples from different sources are alike, the relative molecular weights of the resins may be compared in terms of the same K with considerable confidence.** On the other hand, where any possibility of chemical or structural change must be admitted, considerable caution should be exercised in evaluating the data.

Despite these several deficiencies, molecular weight numbers or relative molecular weights have gained widespread use on several accounts, particularly in the characterization of polystyrenes. First, of course, is the ever-present desire to define a complex material in terms of numbers and thereby not only facilitate comparisons of different samples and perhaps even different materials, but also provide a possible means of predicting behaviors and properties from a knowledge of these defining numbers. Second, the chemical characteristics of polystyrene lend themselves especially well to such analysis. It is dissolved readily by common organic solvents and the experimental labor of obtaining these numbers, as has been described, is not too great. (Other resins, notably polyethylene and nylons require rather drastic solvents and/or elevated temperatures and are, accordingly, more cumbersome to handle.) The complications introduced by differences in chemical composition are absent, since, unlike copolymers or hydrolysis products (such as acetals) or reaction products (such as cellulose nitrates), for example, no variations in the relative amounts of monomer present, or the extent of reaction, or the relative positions of chemical groups of one type with regard to those of another type comes into play to vitiate comparisons. Third, these relative molecular weights are related in a definite, fixed fashion with a fundamental property of the resin and are therefore reproducible with a high degree of precision not only from day to day or operator to operator within the laboratory, but also **from one laboratory to another provided the same experimental conditions are observed and the same K constant is used.**

It has already been pointed out that the average **relative** molecular weight of a polystyrene as computed from equation (I) coincides with **neither** its **number** average **nor** its **weight** average molecular weight. If, however, instead of the specific viscosity defined in equation (II) one considers a function known as the intrinsic viscosity, dilute solution viscosity data can be correlated with the more meaningful molecular weight averages and calibrated to give absolute values. The intrinsic viscosity, (N), which is merely the limit approached by the specific viscosity divided by the concentration, N sp/c, as the concentration approaches zero, can be obtained experimentally by determining the specific viscosities of several solutions of different concentrations then extrapolating to zero a plot of the N sp/c vs c values. It has been empirically correlated with the molecular weight by the expression

N equals K times M to the "a" power (III)

where K and a, which are constants for a given resin in a particular solvent, must be evaluated by calibration against one of the absolute methods, e. g., osmotic pressure measurements. Once calibrated, however, this relatively simple (experimentally) method provides molecular weights in absolute units, and the values so determined possess a quantitative significance lacking in the relative molecular weight numbers. More explicitly, the relative molecular weight numbers are based on the assumption of a linear relationship between viscosity and molecular weight, whereas, actually the relationship, in the case of polystyrene, is the non-linear one shown in equation (III). Consequently, relative molecular weights, although they correctly align samples in their ascending or descending order of molecular weights, are not necessarily in the same ratio as are the corresponding absolute molecular weights.

It should be reiterated once again, perhaps, that molecular weights whenever and wherever quoted, if they are to convey significant and unambiguous rather than partial, and often misleading, information must be supported by supplementary data regarding the method of determination employed, the experimental conditions of the method, and the particular equation and values of the constants, if any, utilized in the computations.

## HENRY DREYFUSS AT S. CAL.

**By W. V. PRINCE**

The Southern California Section held its opening meeting on Thursday, March 4, 1948 in the Mayfair Hotel Rainbow Room. Mr. Henry Dreyfuss, famed industrial appearance designer, spoke on, "What is Good Design?"

This was a big affair and started the section off with a "bang".

## DETROIT WINNERS

The winners as announced by Dr. Storfer, Detroit SPE Prize Paper Committee Chairman, are:

First Prize, $100.00—Mr. R. R. Holman, Fabricon Products, Inc. "Variables Affecting the Bond Strength of Laminated Plastics."

Second Prize, $50.00—Mr. N.W. Trepanier, Reichhold Chemicals, Inc. "Continuous Viscosimeter for the Production Control of Resins and Plastics."

Third Prize, $25.00—Mr. R. F. Wint, Hercules Powder Company. "The March of Cellulosics."

Non-Member Prize, a Plastics Encyclopedia—Mr. M. F. Bendzick, AC Spark Plug Division, General Motors Corporation. "The Development and Manufacture of Acrylic Panel Faces."

## CAMERON AT ROCHESTER

**By GEORGE A. PECK**

37 members of the SPE gathered at Lorenzo's Restaurant in Rochester, February 17, 1948 for a dinner and a talk by Mr. Hugh Cameron, Sales Manager of the W. T. LaRose & Associates, Inc. Mr. Cameron was born in London, Ontario, Canada and educated at the London Technical School. He has been Engineer of Electrical Insulation at General Electric Company, Manager of Standard Resin Company, Assistant Research Director of Marbon Corporation, and Assistant Sales Representative of Thermex Division, Girdler Corporation. Mr. Cameron gave a very interesting talk on High Frequency Heating. He explained the various components of a high frequency heater and had one on display at the meeting. He gave several demonstrations using high frequency heat. His talk also touched on several of the interesting applications of high frequency heat in the non-metallic field.

After the meeting there was the normal question and answer period after which Mr. Gene Cathcart showed a 16-mm. Kodachrome sound motion picture entitled, "The Story of Tenite." This was also very interesting and was enjoyed by all members present.

There was a short business meeting at which time the Membership Committee gave a report that we now have 55 members with applications either confirmed or in process. A questionnaire has been sent out to all members on eating places, programs, etc. It was agreed that we would try Lorenzo's for our meeting place in March, as it seemed to be about the best we have encountered so far.

## CHICAGO HEARS FORMO

**By R. S. STEPHENS**

The Chicago Section of S.P.E. held a cocktail and dinner meeting on Tuesday, March 2, 1948 at the Merchants and Manufacturers Club, Merchandise Mart.

Mr. J. Formo of Minneapolis-Honeywell Regulator Co., spoke on recent developments in steam preheating of phenolic materials.

A new motion picture was presented by General Motors Corporation entitled, "On To Jupiter."

Reservations were handled by Robert S. Stephens of Kurz-Kasch, Inc. and arrangements were made by Elmer C. Maywald, program director.

## WESTERN NEW ENGLAND

**By E. W. VAILL**

Mr. James Bailey, Research Director, Plax Corporation, spoke on "The Mechanics of Plastic Extrusion" at the dinner meeting of the Western New England Section on March 3, 1948, which was held in the Hotel Sheraton in Springfield, Massachusetts.

## Pacific Coast Section of The Society of Plastics Industry Conference March 28, 29, 30, 31

"The general theme of our 1948 Conference is, "Creative Selling for Good Plastics," states Herbert C. Pratt of American Cyanamid Company, Conference Chairman.

"Much progress has been made in the industry toward the production of better plastics through proper material application. This was one most necessary step in the development of this young industry.

"Now we believe that with the industry faced with an ever increasing abundance of plastic raw materials, there is a great need for the molder and fabricator to think in terms of new end uses to absorb this new production. In expanding the fields of utilization of plastics, creative selling will play an important part in this program with cooperative spirit shown in the plastics industry."

Speakers at the Conference who will bear directly upon the theme of "Creative Selling for Good Plastics" will include:

Mr. R. B. Gutsch, Chairman of the Pacific Coast Section, Introduction.

Mr. Neil O. Broderson, Chairman, National Board of Directors of the S.P.I., "Review of the Plastic Industry."

Mr. Roy Peat, Former Chairman of the Pacific Coast Section of S.P.I., on "The Pacific Coast Plastic Industry."

Mr. C. J. Romieux, Sales Manager of American Cyanamid Company on "Where Do We Go From Here?"

Mr. George H. Clark, President of the S.P.I. and Chief Engineer of Formica Insulation Company, The President's Message.

Mr. W. T. Cruse, Executive Vice-President, S.P.I. on "Current Developments of Concern to the Plastics Industry."

Mr. E. M. Stuart, Sales and Publicity Director, Broadway Department Store, on "Merchandising."

Mr. J. Fraser Rae, Industrial Plastic Service, Oakland, California, Introduction, Technical Panel.

Mr. Walter E. Rahm, of E. I. DuPont de Nemours on "Injection Molding of Nylon."

Mr. W. O. Bracken of Hercules Powder Company, "Dimensional Stability of Cellulosic Plastics."

Dr. E. L. Kropa, American Cyanamid Company, on "Unsaturated Polyesters."

Mr. R. H. Perry, Chief Chemist, Union Bay State Chemical Company, on "Organic Peroxides."

Mr. C. A. Norris, Assistant Sales Manager, Bakelite Corporation, on "The Practical Application of the Theoretical Aspects of Transfer and Plunger Type Molding of Thermo Settings Materials."

Mr. Scott Moulton, Technical Service Manager of Geon Thermoplastics, B. F. Goodrich Chemical Company, comments on "England and Its Plastic Industry."

# EUROPEAN HISTORY IS SUBJECT OF TALK BY DeBELL AT WESTERN NEW ENGLAND

By GEORGE W. MARTIN

The February meeting of the Western New England Section of the Society of Plastics Engineers, was held on the 4th at the Hotel Sheraton in Springfield.

The incoming officers and directors were introduced by Mr. Mario J. Petretti, the outgoing president. They were as follows:

Mr. Frank J. Donohue, President, Monsanto Chemical Co., Springfield, Mass.

Mr. Sherwood L. Young, Vice-President, C. F. Church Mfg. Co., N. Main St., Monson, Mass.

Mr. Ed. W. Vaill, Secretary, Bakelite Corporation, Hartford, Connecticut.

Mr. Jack T. F. Bitter, Treasurer, The Parker Stamp Works, Inc., 650 Franklin Avenue, Hartford, Connecticut.

Remaining Directors (New and Incumbent):

Mr. George W. Whitehead, Improved Paper Machinery Corporation, 46 Puritan Circle, Springfield, Mass.

Mr. Wesley S. Larsen, DeBell & Richardson, Inc., P. O. Box 240, Springfield, Mass.

Mr. George W. Carlson, Arrow-Hart & Hegeman Co., 103 Hawthorne St., Hartford, Connecticut.

Mr. Mario J. Petretti, Noma Electric Corporation, 178 Sargeant St., Holyoke, Massachusetts.

Mr. Henry M. Richardson, DeBell & Richardson, Inc., P. O. Box 240, Springfield, Mass.

Mr. Donohue then congratulated Mr. Petretti on his election to National Vice President and also on the splendid job that he and his fellow officers did during the past year. Mr. Donohue then turned the meeting over to Harry Richardson, who in turn, introduced the guest speaker of the evening, Mr. John DeBell, of DeBell and Richardson, Inc.

Mr. DeBell had chosen for his topic, a very timely and interesting subject, "Plastics and General Business Conditions of Europe." This was based on his trip to Europe during November and December of 1947.

While the countries visited were all in various conditions of strain, which was almost desperate in Germany, there seems to the speaker a reasonable chance of European recovery if the United States can tide over some of the immediate needs and the people can get to work.

In England, there seems a good spirit to produce and the chemical industries have ambitious programs. ICI is putting up large cracking facilities which will give them a source for properly priced polyethylene; and both that company and BX Plastics are erecting new factories for plastic materials. Coal production was steadily rising and sturdiness of purpose was generally evident. Among interesting new plastic items were polyvinyl chloride battery spacers and laminated vinyl sheet; production of Terylene, the new textile fiber from terephthalic, and glycol was still limited.

In Sweden, business was good and the country was prosperous; but there has been grave deterioration of hard money reserves on account of extensive social benefits, uncurbed purchases from the United States of consumers goods and performance of the Russian trade agreements. Some of the Russian practices such as the sale of motors on the Swedish black market irked the Swedes. Laboratories were excellent; the manufacturing plants were well equipped and up-to-date; and industry seemed to be in excellent physical condition.

The grave problem facing France, observed Mr. DeBell, was the disparity between the cost of food which had risen 20 times, and wages or manufactured goods, which had increased only 8 times during the war. Food producing capacity was high: with a good crop year (1947 was very bad), France should be able to feed itself and even have food left over. However, the workmen in the large cities were not faring well; they should be

*(Continued on Page 16)*

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## EUROPEAN INDUSTRY

(Continued from Page 15)

given considerable credit for rejecting Communist agitation in November under these adverse conditions.

Mr. DeBell stated that there does not seem to be much likelihood of European recovery unless Germany does its share of production. At the time, conditions in Germany were definitely bad. There was general shortage in food, fuel, and transportation. In the chemical industry, however, there is some present export of napthalene and urea. If means could be found to permit German chemical industries great latitude of action, to merge the western zones, to acquire either a decent currency or the right to barter, and to reduce the time lost through red tape, there could be a sizeable export of chemicals next summer without detriment to German economy. This assumes, of course, political tranquility, and continued high coal production. It was interesting to note that research still continued. German technologists called attention to new synthetic emulsifying waxes, vinyl chloride, copolymers for inside paints, synthesis of adipic nitrile by direct reaction of hydrogen cyanide with 1,4-butenediol, and other advances. In the opinion of the speaker, good recovery could be staged from the present base in spite of all the difficulties. It would call for some reconciliation between the ideas of the occupying powers: the Americans hope for a maximum production to save some of the present billion dollar annual outlay in Germany; the English concede limited recovery but are adverse to German competition in the chemical and textile export field; the French are apprehensive of any German recovery; and the Russians look out for their own interest. The outstanding need is to put all the manpower and all possible productive equipment to work, concluded Mr. DeBell. An interesting discussion followed the talk and the meeting was adjourned by Mr. Donohue.

## CENTRAL OHIO HISTORY

(Continued from Page 5)

(Columbus Plastic Products), C. D. Jones (Owens-Corning), and B. W. Hively (Multicol).

The Central Ohio Section includes in its membership many individuals of unusual talents and accomplishments. Many have been employed by some of the leading concerns in the United States, such as General Motors, General Electric, DuPont, Goodyear, Chrysler, International Harvester, and others. At least three have taught courses in plastics (P. O. Powers, R. L. Davis, L. E. Cheyney.) Four are authors or co-authors of books in the field of plastics (R L. Davis, R. D. Beck, P. O. Powers, R. J. Francis). Several are active in plastics and related activities of other societies —P. O. Powers is chairman and E. E. McSweeney is secretary-treasurer of the Paint, Varnish, and Plastics Division of the American Chemical Society, P. O. Powers is a member of the subcommittee on plastics of the National Research Council, R. J. Francis and C. E. Bacon are active in the low-pressure laminates committee of S.P.I., R. M. Lane has served on the N.E.M.A. Laminating Technical Committee, R. C. Williams is active in the Wire Association, L. E. Cheyney is active in A.S.T.M. Committee D-11, E. E. McSweeney is active in the Federation of Paint and Varnish Production Clubs. Several members of the section are well-known for technical articles on plastics and related subjects; among these are P. O. Powers, R. J. Francis, L. E. Cheyney, J. W. Knight, E. E. McSweeney, K. M. Gaver, R. L. Davis, C. E. Bacon, R. M. Lane, and R. A. Clark.

## Personals

**Fred J. Kraft** of Venango Plastics, Franklin, Pennsylvania, experienced unfortunate accident in which he broke his leg. At the moment of writing he is confined at St. Vincent's Hospital, Erie, Pennsylvania. Fred is well known in Northwestern Pennsylvania Section because of past connections with Franklin Plastics, Nosco Plastics, and Erie Resistor Corporation.

**William R. Byrd,** proprietor of Byrd Tool and Mold Company. was the subject of a recent feature article in the Erie Dispatch Herald. Because of the phenomenal growth of his comparatively new company, due almost entirely to his energy and progressiveness, Bill was likened to Horatio Alger.

**William J. Phillips,** President of Presque Isle Plastics, Erie, Pennsylvania, has announced the organization of a new subsidiary at the same location, known as Presque Isle Laboratories and Manufacturing Company. The new company is devoted to research involving the processing of plastics. It is also understood from Bill Phillips, who just purchased a large suburban house with 3 gas furnaces, that he will gladly volunteer a first hand report on the local gas situation to anyone interested in asking.

**James P. Quinn** has been appointed "sponsor" of the March meeting of the Northwestern Pennsylvania Section of the SPE, in the name of Quinn-Berry Corporation of which Mr. Quinn is President. The individual sponsorship of a meeting is part of a new plan to instill added interest by virtue of giving each meeting the benefits of personal treatment on the part of various energetic members, which it is believed will bring about contrasting programs and keep attendance at a high level.

**Robert Kling,** Chief Mechanical Engineer, Erie Resistor Corporation (Plastics Division) Erie, Pennsylvania, has been a victim of appendicitis and of modern science. He was successfully operated on Saturday, February 21, was put on his feet on Sunday and sent home on Monday.

Badger Plastics, Inc., announce that their Extrusion Division has been sold to the Defiance Machine Works, Inc., and that George P. Anderson will be associated with them.

The Injection Division of the company has been sold to the Plastics Engineering Co. of Sheboygan, Wis.

## BALTIMORE - WASHINGTON

**By W. R. BAILEY**

A meeting of the organizing group for the Baltimore-Washington Section of the SPE was held at 8 p. m., February 3, at the Willard Hotel, 14th and Pennsylvania Avenue, N. W., Washington, D. C.

Those in attendance were: Dr. Albert Lightbody, Mr. John Alfers, Mr. Henry Nowak, Mr. Kendrick, Dr. Gordon M. Kline, Mr. W. R. Bailey, and Mr. E. B. Stratton, Jr.

Mr. Bailey presided and opened the meeting by reading Mr. T. E. Orr's letter which announced the new National President, Mr. J. H. DuBois. The letter went on to say that as of January 21, the Baltimore-Washington Section was recognized and authorized to elect officers.

A count was made of the number of members who were certain to send in their checks. In both sections there were 40 members, five transfers from other SPE Sections, two junior members, and fourteen prospects.

Mr. Kendrick agreed to contact outlying commercial concerns, such as American Viscose Co., Fort Royal, Va., O'Sullivan Co., Winchester, Va., Hagerstown Rubber Co., and Fairchild Aircraft Co., Hagerstown, Md.

Mr. Crater will solicit the New Cambridge Rubber Plant moving to Baltimore from Massachusetts, the commercial plants in Baltimore, Edgewood Arsenal, etc.

Dr. Lightbody will get in touch with the University of Maryland and the Johns Hopkins Applied Physics Laboratory on Georgia Avenue, Washington, D. C.

Mr. Alfers suggested that the electrical technical field should be an excellent one for men who were doing a great deal of plastic work.

Cards were mailed out announcing a general meeting March 9, 1948 for the election of officers and directors. Mr. Bailey presided and the present group acted as nominating committee at the next meeting.

## FERGUSON COMPANY EXPANDS

The J. A. Ferguson Company of Erie, Pennsylvania, has just completed an addition which will triple its floor space. This company has earned a reputation of being a top-notch source for precision mold work and the increase in capacity is a direct outgrowth of the expanding volume of business which is naturally attracted by good workmanship. Messrs. John A. Ferguson and R. C. Asmus, partners in the J. A. Ferguson Company, are both members in the Northwestern Pennsylvania Section.

## PLASTICS IN AIRCRAFT

*(Continued from Page 1)*

Radomes, which have been constructed from laminated plastics and other materials, invariably possess poor resistance to erosion by rain. Laminated plastics, which have probably been studied most thoroughly for direct structural applications in wings and fuselages, usually fail to stand the necessary static loads. Many plastic materials, which have been used in molded or extruded parts, possess insufficient dimensional stability. Practically none of the thermoplastic materials are sufficiently stable toward temperature change. Most of the thermosetting materials tend to be too brittle. Thus, it is seen that none of the plastics materials which have been employed can be considered highly satisfactory. In most cases, they have represented some improvement over other available materials. Sometimes the improvement is only in greater ease of fabrication. But it can rather safely be stated that the aircraft industry is not completely satisfied with any plastic material that has been employed to date in the design and construction of aircraft.

The use of jet-propulsion has received a tremendous amount of publicity. A significant thing about jet propulsion aside from the higher speeds which result from its use, is the

*(Continued on Page 18)*

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# PLASTICS IN AIRCRAFT

*(Continued from Page 17)*

fact that operating temperatures are much higher, especially in the jet tubes. There is serious doubt whether any plastics materials, even the highly publicized "silicones", possess sufficient temperature-resistance to have any application in jet engines, although plastics could probably find structural applications in jet-propelled aircraft operating at subsonic speeds.

There is a trend toward lighter and lighter materials in construction. Aluminum is already considered by many aircraft designers to be far too heavy for the planes of the future. There are not many other materials now available which are lighter. There are certain magnesium alloys, and probably other low-density alloys can be developed. Organic materials, including rubbers and plastics, and carbon itself just about complete the list. It has been stated that the desirability of a material for future aircraft construction is inversely proportional to some power of its density; some power greater than one. One of the possible applications of plastics to satisfy this need for lighter materials is in the type of construction known as "sandwich" construction. The core material, the low-density part of the sandwich, is usually resinous in character. It is often reinforced with fibrous materials. The skin or facing material for the sandwich may, in some cases, be metal, such as aluminum — in others, it may be wood, resin-impregnated paper, or cloth laminates. Laminates prepared from glass fabric combine high strength with light weight and are outstanding for such uses.

There is a tremendous amount of interest in rockets and related-type vehicles. These are usually powered with some unorthodox type of fuel system. Some fuels which have been suggested would require refrigerating systems to maintain certain of their ingredients in the proper liquid condition. Most of them develop extremely high temperatures during actual combustion. As a result, the materials found in such vehicles must exhibit satisfactory properties over extremely wide temperature ranges. The ability of organic materials of construction to withstand the higher end of this range, is seriously questioned.

The effects of greater speeds caused by more powerful planes and newer designs show up in several ways. It may be expected that fatigue in any material of construction will be much more critical since the material is not only subjected to a "Static" high speed but is usually under some dynamic stresses, at the same time.

Increase of landing speed from 80 to 90 miles per hour, is only an increase of 10 miles per hour, which, in itself, is not very great. This 10-mile increase in landing speed actually represents an increase of one-fourth in kinetic energy. Furthermore, the landing speed is proportional to the top speed and such increase in kinetic energy is necessitated by any increase in top speed. The extra load which is placed upon the tire of an airplane in landing, when we increase the landing speed or the dead-weight of a plane or its pay load, may be sufficient to multiply by many times the problems of engineering an airplane tire. Plastics are used in fiber form (nylon) in such tires, and problems associated with their manufacture are ones which to be given consideration. Likewise, the added strain placed upon brakes and other parts of the landing mechanism is much greater than indicated by the first casual note of a slight increase in speed. Brake linings are actually reinforced plastics, hence the plastics industry again has a direct interest in this problem.

There is a trend in design toward placing the radomes in various parts of the plane structure. This move introduces new problems concerned with interference, and the effects of such things as de-icing in that particular part of the plane's structure. There is a definite attempt to use the integral fuel tank (the sealed wing structure, itself, serves as a fuel tank) in order to save weight and increase the fuel capacity of the plane. Sealing of such tanks is a serious problem and the successful material will probably be a plastic or one of the related rubbers, properly formulated to withstand the various extremes of temperature and other conditions to which the seams of the integral tank are exposed. Flammability of various parts of the aircraft structure is a problem and this is a property of any plastic material which must be given definite consideration when it is suggested for use in aircraft construction.

Although the aircraft manufacturing companies are largely metal fabricators, they are the first to admit that many of their problems cannot be solved by the use of metals. They are willing to try other materials. They have tried many of the so-called plastics often with unfavorable and unfortunate results. In defense of the plastics, it may safely be stated that many of the attempted applications have failed because of improper technique, improper choice of materials, or other contributing factors. Nevertheless, aircraft engineers are inclined to view any new plastic materials with some suspicion and understandably so.

There is a definite opportunity for the plastics industry to supply materials which will satisfy the needs of aircraft design and construction. Many of these needs are rather extreme. Plastics will not solve all the needs of the aircraft industry—far from it. I do believe that plastics will provide a solution to many of their problems if the proper attention is given, in the plastics and resin industry, to these problems.

### Problems Requiring Solution

There are two very significant faults of all the plastic materials which have been employed in aircraft, with the possible exception of those which have been used for small knobs, handles, and non-structural applications. In general, most of the plastic materials have been nonuniform. Other materials are admittedly nonuniform. Nevertheless, anyone who is acquainted with the

peculiarities of polymers and resins knows that uniformity is one of the biggest problems which we have to lick.

Another, and perhaps equally important problem, is that of fabricating techniques. It is believed by many that we could make a satisfactory wing out of a glass-fiber-reinforced resin, properly formulated and properly fabricated. In order, however, to produce such finished products at any reasonable cost, new manufacturing techniques are needed; and until such times as manufacting techniques are available, so that we may turn out a uniform product, with sufficiently satisfactory properties, at a reasonable rate of speed, and at a reasonable cost, plastics simply will not be applied, to any degree, in aircraft construction.

Admitting that these two problems are very general ones which apply to practically all plastic materials, there are specific problems which must also be solved to some extent. We need polymers or resins which will maintain their properties over wider temperature ranges—which will function at either high temperatures or low temperatures, preferably at both. We need resins which, perhaps only in the reinforced condition, have greater fatigue resistance. We need resins which have much better dimensional stability. We need resins of improved erosion or abrasion resistance. We need resins or methods of formulating or fabricating resins of improved de-icing properties. There is always a place for resins of improved electrical characteristics, of higher tensile strength, or greater impact resistance, of greater optical clarity, or any one of a number of other specific characteristics.

Although its materials requirements are unusually severe, the aircraft industry is one place where cheapness of a raw material is not a prerequisite for its consideration. It has been stated that 70% of the cost of aircraft built by present methods is fabrication cost. Consequently, the aircraft industry is prepared to absorb much higher raw materials costs, provided satisfactory fabrication procedures can be developed, so that the ultimate cost would certainly be lower. It is my personal belief that the plastics industry can help to solve many of these problems. The solution is not an easy one. It offers a very definite and very concrete challenge to the ingenuity of all the engineers, chemists, physicists, and other technical people within the plastics industry. There is a tremendous potential available; the question is—can we realize this potential?

### A Method of Approach

An obvious answer, especially to a research man like myself, is more research. Research has made possible the tremendous strides of the past few years. Continued research should lead to still more spectacular results.

The type of research which should enable plastics to solve many of these problems may be classified as: (1) development of new materials, (2) improvement of properties of presently known or available materials. (3) development of new techniques, (4) lowering of costs, especially performance costs.

The question of facilities and personnel can often be answered by contracted research, whether in private consulting laboratories, universities, or research institutes. These organizations provide equipment and skilled personnel which allow any manufacturer, regardless of size, to carry on a desired research program at practically any desired rate of effort.

Another possibility which has been receiving increasing attention recently is group-sponsored research. Groups such as textile manufacturers and paper companies have established their own cooperative laboratories. Other groups such as certain metal companies, companies in the printing industries, and producers of bituminous coal, have formed research associations which sponsor research in university or institute laboratories. The aircraft companies and the government cooperate in sponsoring a limited amount of research in the field of aircraft materials, through the National Advisory Committee for Aeronautics.

It is obvious that the mechanism for solving the problems are available. The problems are clearly defined. The next and obvious step is the realization by groups such as this that the problems can be solved by such means.


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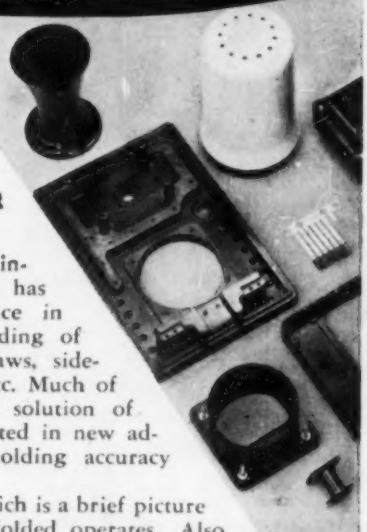

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## SPEAKERS COMMITTEE REPORT

**By J. O. REINECKE**

It has been my observation that the most important phase of the S. P. E. is the local monthly meetings and that the success of the individual Sections is directly in relation to the quality of the meetings. In addition to the direct benefits obtained by the members present at meetings, there are indirect advantages to be gained through publication of articles or digests in the SPE News and the maintenance of a clearing house for information.

I, therefore, recommend that the National President appoint as National Speakers Committee Chairman a Director whose ability, and enthusiasm, will enable the Society to derive the full potential benefits from local meetings.

I suggest that the following procedures be adopted:

1. An attempt be made by the National Speakers Committee Chairman to contact newly elected Local Presidents at the National Meeting in Detroit to obtain their co-operation and the names of the Local Program Chairman in 1948. Local Chairmen should be contacted immediately, either personally or by mail, to assure proper functioning for the entire year of 1948, starting with the February Meetings.

2. Add to the existing list the names of speakers collected during 1947. Descriptions of the successful programs may be incorporated also. The revised up-to-date list should then be sent to each Local Program Chairman. In event the Chairman is not known, the list should be to the Local President, with a request that a Local Program Chairman be appointed immediately.

3. Local Program Chairmen should be advised to send Meeting Announcements to the National Speakers Committee Chairman and the Editor of the SPE News.

The Editor should be notified of Meetings—giving the speaker's name, subject, date and location of the meeting—prior to the regular mailing whenever possible to meet the publication deadline.

4. Speaker Rating Cards should be sent to the National Speakers Committee Chairman after each meeting.

5. Local Chairmen should be encouraged to obtain copies of speeches for submission to the SPE News. In event copies are not obtainable, a brief description of the talk should be prepared by the Program Chairman, or local representative of the News, and sent to the Editor.

6. A monthly report should go to all Local Program Chairmen incorporating the additional approved speakers and subjects reported for the prior month, suggestions for special or unique meetings and information on Technical Developments, or subjects which should be used by all Local Sections.

7. A selected group of speakers who are available on short notice, listed by territories, should be maintained by the National Speakers Chairman as an aid to Local Program Chairmen when they are unable to obtain a speaker.

8. Consideration should be given to a standard method to be suggested for use by all Local Sections in the preparation of their announcements, return post cards, and maintenance of mailing lists.

9. New Program Chairmen should be instructed to obtain the complete files of retiring Chairmen.

The major difficulties encountered during 1947 were:

a. Getting smooth operations into effect during the early part of the year.

b. The natural fact that certain Program Chairmen were improperly selected and did not do a satisfactory job. (On the other hand, several Chairmen did excellent jobs.)

c. Programs were not prepared far enough in advance.

* * *

I shall be glad to give whatever help I can to the 1948 National Speakers Chairman and assure him that he has an opportunity to render a most valuable assistance to the Society.

## BROSIUS IS MANAGER

**Mr. R. M. Brosius,** formerly sales engineer with the Plastics Division of Rohm & Haas Company in the Chicago area, has been appointed general manager of J. B. Products Company, Chicago. This company specializes in metal stamping, plastic finishing and assembling.

# NEW MEMBERS

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335 Fifth Street
San Francisco, Cal.

LEONARD E. FABER
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50 Brady Street
San Francisco 3, Cal.

E. GEORGE KAMPA
29 Hopkins Street
San Francisco 14, Cal.
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HENRY M. PREUSSER
Western Regional Laboratory
800 Buchanan Street
Albany, Cal.
X 1137 Grizzly Peak Blvd.
Berkeley 8, Cal.

ROBERT ROMO
Griffith Tool & Die Company
4132 Anza Street
San Francisco 21, Cal.
X 1724 Balboa Street
San Francisco 21, Cal.

ROBERT SERVICE
American Molding Company
355 Fremont Street
San Francisco, Cal.
X 1031 Frederick Road
San Leandro, Cal.

CLARENCE SPENDER
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355 Fremont Street
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ERNEST N. SPRATLING
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San Francisco, Cal.
X 2010—16th Avenue
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ROGER C. STEELE
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P. O. Box 617
Lafayette, Cal.

PETER JOHN TURKOVICH
Griffith Tool & Die Company
4132 Anza Street
San Francisco, Cal.
X 161 A Propect Avenue
San Francisco 10, Cal.

RICHARD M. WEBER (Engraving & Die Shop) Owner
772 Harrison Street
San Francisco 7, Cal.

ROBERT IOHN WNUKOWSKI
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X 70 Apollo Street
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CHARLES EMORY WEHN, Vice-President
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Alameda, Cal.

### Associate

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WILLIAM W. HOWELL
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X 366 Forrest
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RODRIGO AMPODIA DEL VALLE, General Manager
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Vincente Suarez 153-4
X Zamora 93, Mexico, D. F.

FERMIN FULDA, Jr.
Cia Industrial De Plasticos, S. A.
Lago Texcoco No. 112
Col Anahuac Mexico, D. F.
X Ba Jio No. 318, Mexico, D. F.

JORGE J. LOPEZ, Sales Mgr. Plastics
E. Uhthoff Y Cia. S. A.
(Rep. Monsanto Chemical Co.)
Zacatecas 168, Mexico, D. F.

JORGE NOE MARTINEZ
Cia. Hulera Euzkadi
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WILLIAM B. MAY, Jr.
Plastipos, S. A.
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GERMAN MUELLER
Plastipos, S. A.
Lecheria Edo. Mexico

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Mexico, D. F.

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Kansas City, Mo.

JAMES G. HARPER, Partner
Holiday Plastics, Inc.
7025 Prospect
Kansas City 5, Mo.

LAURENCE H. WOLFE, Partner
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Kings Highway, Independence, Mo.

LINDSEY L. KING
Plastic Pressed Forms, Inc.
325 Southwest Blvd.
Kansas City 8, Mo.

JOSEPH G. THOMPSON
Kansas City School of Plastics
3827 Main Street
Kansas City 2, Mo.

### Associate

WILLIAM H. WEAVER
Injection Molding Company
3918 Washington Street
Kansas City 2, Mo.

NED D. GALLAGHER, Draftsman
Regal Plastic Company
710 Main Street
Kansas City, Mo.
X 3607 Chestnut Street
Kansas City, Mo.

LAURENCE G. SHARP
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5205 Wilburn Street
Kansas City, Mo.

## NEW YORK

### Member

HERBERT B. REED, Jr., Technologist
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# Second Annual

# S.P.E. Prize Paper Contest

Papers should be submitted to the nearest local S. P. E. Section president, not later than midnight Nov. 15, 1948.

**Subject:** The paper should be of general interest to the plastics industry and not previously published.

**Length:** Papers may not exceed 5000 words.

**Who is Eligible?** ANYONE. There are no restrictions as to age or SPE Membership.

**Prizes:** Local Sections will pick winners among papers submitted to that Section and will award local prizes. Local prize papers will be judged in the National Contest by well-known judges. National Awards: $200, $100, $50 for first, second, and third.

*The SPE reserves publication rights to all local prize winning papers until June 30, 1949.*

The Riehl Printing Co. Cleveland 13, Ohio